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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/673,996	09/29/2003	Tzachi Rafaeli	COLB-124XX	2809
207	7590	12/28/2004	EXAMINER	
WEINGARTEN, SCHURGIN, GAGNEBIN & LEOVICI LLP TEN POST OFFICE SQUARE BOSTON, MA 02109			ARTMAN, THOMAS R	
			ART UNIT	PAPER NUMBER
			2882	

DATE MAILED: 12/28/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/673,996

Applicant(s)

RAFAELI ET AL.

Examiner

Thomas R Artman

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 29 September 2003.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-18 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-9 and 11-17 is/are rejected.
- 7) ☒ Claim(s) 10 and 18 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 29 September 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 02/09/04:06/28/04.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Claim Objections

Claim 10 is objected to because of the following: antecedent basis is lacking for “the feature” in line 4. In order to expedite prosecution, it is assumed that “the feature” is meant to be the “target area” as recited in parent claim 6.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 13 and 15-18 are rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential elements, such omission amounting to a gap between the elements. See MPEP § 2172.01. The omitted elements are: an optical detector and one or more x-ray detectors. Claim 13 requires receiving optical radiation, receiving x-ray photons and generating first and second signals based upon the received radiation/photons without providing the necessary means for doing so.

Claims 15-18 are rejected by virtue of their dependency.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 6, 7, 11-13, 15 and 16 are rejected under 35 U.S.C. 102(b) as being anticipated by Kaiser (US 6,370,221).

Regarding claims 6 and 12, Kaiser discloses an apparatus for x-ray analysis of a sample (Figs.1 and 2), including:

- a) an x-ray excitation source 12 that generates an x-ray beam,
- b) an optical radiation source 21 which generates optical radiation 22 and is aligned with the x-ray excitation source,
- c) an x-ray optic 17 which is arranged to focus both the x-ray beam and the optical radiation onto a spot on the sample,
- d) one or more x-ray detectors 18 that receive x-ray photons from the spot on the sample and generate a first signal in response to the photons that is indicative of a characteristic of the sample (col.5, line 67, through col.6, line 2),
- e) an optical detector 21 that receives the optical radiation reflected from the spot on the sample and generates a second signal that is indicative of an alignment of the spot with a target area of the sample (see at least col.6, lines 3-8).

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Regarding claim 13, Kaiser discloses a method for x-ray analysis, including:

- a) aligning an optical radiation source 21 with an x-ray excitation source 12 such that a spot on the sample that is irradiated by the x-ray beam generated by the x-ray source is illuminated with optical radiation from the optical source (Fig.2, alignment achieved by mirror 23 and collimator 17),
- b) receiving the optical radiation reflected from the sample (using detector 21) and responsively generating a first signal that is indicative of an alignment of the spot on the sample (Figs.5-11),
- c) aligning the x-ray beam, responsive to the first signal, so that the spot coincides with a target area of the sample (Figs.5-11), and
- d) receiving x-ray photons from the spot on the sample (using detector 18) and responsively generating a second signal that is indicative of a characteristic of the target area (col.5, line 67, through col.6, line 2).

With respect to claims 7 and 15, the x-ray beam causes the sample to emit fluorescent x-ray photons which are received by the x-ray detector, and where the first signal is indicative of a composition of a feature of the sample of the target area (col.5, line 62, through col.6, line 2).

With respect to claim 11, Kaiser further discloses a controller (not shown) which aligns the x-ray optic with the sample responsively to the second signal so that the spot is incident on the target area (at least col.7, lines 1-65, as well as Figs.5-11).

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With respect to claim 16, Kaiser further discloses that the aligning of the optical radiation source with the x-ray excitation source includes arranging an x-ray optic 17 to focus both the x-ray beam and the optical radiation onto the spot.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-5, 8, 9, 14 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kaiser in view of Longoni (ref. "AL" from PTO-1449 filed 02/09/2004).

Regarding claim 1, Kaiser discloses an apparatus for x-ray analysis (Figs. 1 and 2), including:

- a) an x-ray excitation source 12 that is arranged to irradiate a spot on a sample 16 with an x-ray beam,
- b) one or more x-ray detectors 18 which receive x-ray photons from the spot on the sample and which generate a first signal in response to the photons that is indicative of a characteristic of the sample (col.5, line 67, through col.6, line 2),
- c) an optical radiation source 21 that is aligned with the x-ray source in order to illuminate the spot on the sample with optical radiation, and

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d) an optical detector positioned to receive the optical radiation that is reflected from the sample and to generate a second signal that is indicative of an alignment of the spot with a target area of a sample (see at least col.6, lines 3-8).

Kaiser does not disclose a ring arrangement for the one or more x-ray detectors, where the optical detector is arranged in the gap formed by the detectors.

Longoni specifically teaches a ring detector for greatly improved x-ray fluorescence detection. The use of such a detector allows greater sensitivity due to higher count rates and finer resolution because the solid angle having the greatest probability of fluorescent x-ray emission from the sample is intercepted by the detector geometry (see at least col.1 of p.1002).

Furthermore, given the teachings of the placement of the detector relative to the x-ray beam as shown by Longoni, the placement of such a detector in the device of Kaiser will automatically provide for the optical detector 21 being positioned in the gap in the ring via mirror 23.

It would have been obvious to one of ordinary skill in the art at the time the invention was made for the device of Kaiser to have one or more detectors arranged so as to form a ring such that much improved sensitivity and resolution is achieved.

With respect to claim 2, Kaiser further discloses that the x-ray beam causes the sample to emit fluorescent x-ray photons which are received by the x-ray detector, and where the first signal is indicative of a composition of a feature of the sample of the target area (col.5, line 62, through col.6, line 2).

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With respect to claim 3, Kaiser further discloses that the optical radiation source 21 is arranged to illuminate the spot from a position within the gap in the ring (via mirror 23).

With respect to claim 4, Kaiser further discloses an x-ray optic 17 which is arranged to focus both the x-ray beam and the optical radiation onto a spot on the sample,

With respect to claim 5, Kaiser further discloses a controller (not shown) which aligns the x-ray optic with the sample responsively to the second signal so that the spot is incident on the target area (at least col.7, lines 1-65, as well as Figs.5-11).

With respect to claims 8 and 14, Kaiser has the structure as outlined above in the rejection of claims 6 and 13, respectively, but does not include the additional limitation that the one or more x-ray detectors are arranged so as to define a ring.

Longoni specifically teaches a ring detector for greatly improved x-ray fluorescence detection. The use of such a detector allows greater sensitivity due to higher count rates and finer resolution because the solid angle having the greatest probability of fluorescent x-ray emission from the sample is intercepted by the detector geometry (see at least col.1 of p.1002).

It would have been obvious to one of ordinary skill in the art at the time the invention was made for the device of Kaiser to have one or more detectors arranged so as to form a ring such that much improved sensitivity and resolution is achieved.

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With respect to claims 9 and 17, Kaiser has the structure as outlined above in the rejection of claims 6 and 16, respectively, but does not include the additional limitation of having a polycapillary x-ray optic.

Longoni specifically teaches the advantage of having a polycapillary x-ray optic such that finer positional resolution can be achieved through providing a smaller x-ray beam spot size on the sample (see at least col.1 of p.1005). Thus, smaller features can be analyzed.

It would have been obvious to one of ordinary skill in the art at the time the invention was made for the device of Kaiser to have a polycapillary optic such that the position resolution is successfully made smaller for ease of measuring finer features on the sample.

Allowable Subject Matter

Claims 10 and 18 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. Further, the above antecedent basis issue raised by claim 10 must also be appropriately addressed.

The following is a statement of reasons for the indication of allowable subject matter:

The prior art of record neither teaches nor reasonably suggests the additional limitation of having the mirror being removable from the beam path during the x-ray analysis procedure as required by the combination of claim 10. The prior art of record, Kaiser and Fischer (US

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4,799,246), and in fact the prior art as a whole, specifically teach a mirror being in the path of the x-ray beam at all times for the specific advantage of having real-time monitoring capabilities for manual or automated alignment adjustments, while having negligible attenuation of the x-ray beam.

The prior art of record neither teaches nor reasonably suggests the additional limitation of having the x-ray beam strike a target sample at a point from which light is emitted, and aligning the optical radiation source with the point on the target, as required by the combination of claim 18. The best prior art of record, Fischer, teaches the use of physical alignment markings on the collimator for such alignment purposes.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Hasegawa (US 6,404,846) teaches the use of x-ray fluorescence for alignment purposes. Rossiger (US 6,038,280) teaches the practice of using light images for monitoring an x-ray analysis. Hosokawa (US 4,521,905) teaches the importance of having the optical beam aligned with the x-ray beam. Peyser (US 3,156,824) teaches an adjustable mirror and optical radiation source for alignment of the optical beam with the x-ray beam. All prior art of record has mirrors placed in the x-ray beam path at all times for aligning/diverting the optical beam.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thomas R. Artman whose telephone number is (571) 272-2485.

The examiner can normally be reached on 9am - 6:30pm Monday - Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ed Glick can be reached on (571) 272-2490. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Thomas R. Artman
Patent Examiner



Craig E. Church
Primary Examiner